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Cite as: AIP Conference Proceedings **2333**, 100005 (2021); https://doi.org/10.1063/5.0041762
Published Online: 08 March 2021

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Statistical Data and Programming Languages Analysis for Developing a Chatbot in Telegram

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Abstract: In the modern world it is necessary to use various IT technologies for effective and high-quality work of the company. Today, the competitiveness and survival of the company in the market depends on this. Various applications and chat bots are very important means to achieve company's goals. The article provides statistics on the popularity of programming languages for 2020. Based on the results of statistical data review, several programming languages are selected for comparative analysis as the most convenient means for writing a chatbot in the Telegram messenger.

INTRODUCTION

In the modern world for effective and high-quality work of the company it is necessary to use various IT technologies. Today, the competitiveness and survival of the company in the market depends on this. Various applications and chatbots are very important means to achieve the goals of the company. As a part of this study, it is planned to write a chatbot program for the Telegram messenger, which will helpto increase the productivity of the technical support service of the software development company «SKB Kontur». Current work provides a comparative analysis of popular programming languages, among which it is necessary to choose one that is most suitable for writing a chatbot.

BASIC CONCEPTS AND TYPES OF PROGRAMMING LANGUAGES

A programming language is a set of lexical, syntactic, and semantic rules that determine the appearance of a program and the actions that an executor (usually a computer) performs under its control. A program is code written in accordance with the rules of a given programming language. The code that makes up the program is called "source code".

Programming languages are formal artificial languages. Like natural languages, they have an alphabet, vocabulary, grammar and syntax, as well as semantics [1-3].

Alphabet is a set of characters allowed for use, with the help of which words and values of a given language can be formed. Syntax is a system of rules that determine the permissible constructions of a programming language from letters of the alphabet. Semantics - a system of rules for the unambiguous interpretation of each language construct, allowing the process of data processing.

All programming languages are divided into two types - low- and high-level languages [4]:

- Low-level languages represent a way of writing computer instructions in a hardware language, that is, in machine codes (as a sequence of zeros and ones). Low-level languages are strictly oriented to a specific type of equipment (processor control system, each type of processor has its own machine code).

Applications of Mathematics in Engineering and Economics (AMEE'20)
AIP Conf. Proc. 2333, 100005-1–100005-5; https://doi.org/10.1063/5.0041762
Published by AIP Publishing. 978-0-7354-4077-7/$30.00

- High-level languages are programming languages allowing writing programs in the form convenient for humans. These languages are oriented not to the system of instructions of one processor or another, but to the system of operators (instructions), which is typical for writing a certain class of algorithms.

High-level languages are easier to use, because their task is to serve the needs of the programmer, and not to determine the capabilities of the computer. Programs written in these languages must be recoded - translated into machine language so that the computer can understand them before running the programs. Therefore, various programming systems include either a language interpreter or a compiler.

Low-level languages, close to the machine language, allow creating programs that run faster and allow more efficient use of computer resources.

STATISTICAL ANALYSIS OF THE MOST POPULAR PROGRAMMING LANGUAGES USAGE

Today, there are a large number of different programming languages and each of them has its own scope. To conduct a comparative analysis of programming languages and select the most suitable language for writing a chatbot, several of the most popular programming languages were selected. Next, let's turn to the statistics on the popularity of programming languages [5].

Figure 1 shows rating of programming languages in commercial projects in 2020.

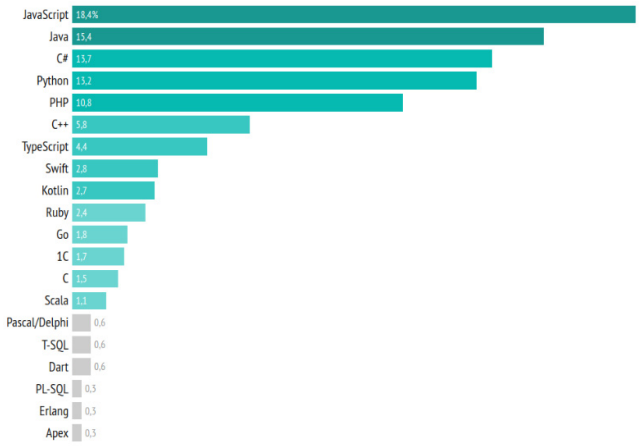

FIGURE 1. Rating of programming languages

Based on the data presented one can conclude that the JavaScript language is much ahead of Java and now it is the most popular programming language. The five best languages also include: C #, Python, PHP. Figure 2 shows how statistics changed from 2012 to 2020.

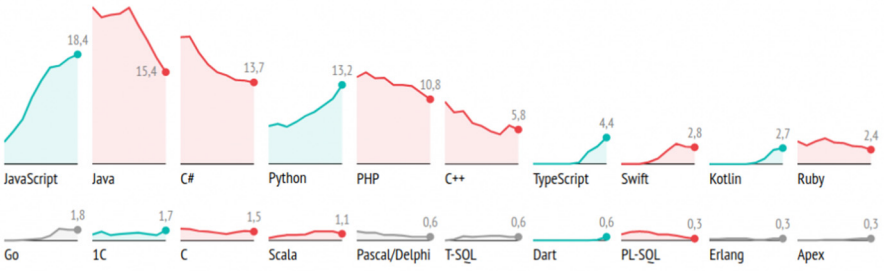

FIGURE 2. Changes in the popularity of programming languages

From Figure 2, we can conclude that the popularity of Java and C# is falling significantly, while the popularity of languages such as JavaScript, TypeScript and Python continues to grow. Next, let's look at the popularity rating based on personal preferences, but for commercial projects. The rating is shown in Figure 3.

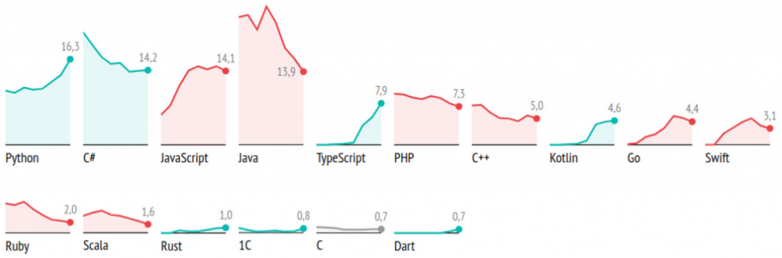

FIGURE 3. Popularity ranking of languages according to personal preferences

From Figure 3 one can conclude that people choose Python, then C#, and then JavaScript based on their personal preferences. Figure 4 shows statistics on the use of programming languages in personal projects.

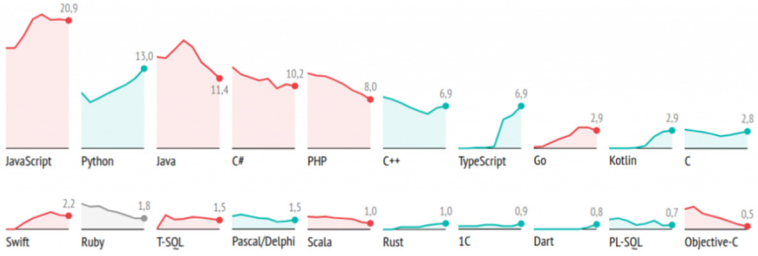

FIGURE 4. Statistics on the use of programming languages in personal projects

According to the data presented above, the most popular languages at the moment are JavaScript, Python, and C#, so we will choose these languages for analysis and comparison.

COMPARATIVE ANALYSIS OF PROGRAMMING LANGUAGES

Python is a high-level General-purpose programming language that is also used for developing of web applications. Using of this language increases developer productivity and code readability.

Python supports various programming paradigms: structural, object-oriented, functional, imperative and aspect-oriented. The language includes dynamic typing, automatic memory management, full self-monitoring, exception handling, support for multithreaded computing and practical high-level data structures [6]. Table 1 below shows the advantages and disadvantages of the Python programming language.

TABLE 1. Advantages and disadvantages of the Python programming language

Advantages	Disadvantages
− open development; − quite easy to learn, especially at the initial stage; − syntax features encourage the programmer to write highly readable code; − provides a means of rapid prototyping and dynamic semantics; − has a large community that is positive towards newcomers; − many useful libraries and language; − absolutely everything in Python is an object in the sense of OOP, but the object approach is not imposed on the programmer.	− not a very good multi-threading support; − there are not many high-quality software projects created in Python compared to other universal programming languages, such as Java; − lack of commercial support for development tools (although this situation changes over time); − initial limited resources for working with databases; − benchmarks show lower Python performance compared to the main Java VMS, which gives this language a reputation for being slow.

JavaScript is a multi-paradigm programming language. It supports object-oriented, imperative, and functional styles [7, 8].Table 2 below shows the advantages and disadvantages of the JavaScript programming language.

TABLE 2. Advantages and disadvantages of the JavaScript programming language

Advantages	Disadvantages
− no modern browser is complete without JavaScript support; − not a specialist can handle the use of JavaScript plugins and scripts; − useful functional settings; − constantly improving language – a beta version of the project, JavaScript2, is currently being developed; − you can interact with the app even through text editors such as Microsoft Office and Open Office; − the prospect of using the language in the process of teaching programming and computer science.	− reduced security level due to widespread and free access to the source code of popular scripts. − a lot of small annoying errors at every stage of the work. Most of them are easily corrected, but their presence makes it possible to consider this language less professional than others. − widespread distribution. A peculiar disadvantage is the fact that some actively used programs (especially applications) will cease to exist in the absence of a language, since they are entirely based on it.

C# is a programming language that combines object-oriented and context-oriented concepts. Table 3 below shows the advantages and disadvantages of C# programming language.

TABLE 3. Advantages and disadvantages of C# programming language

Advantages	Disadvantages
− for small businesses and some individual developers, free tools include VisualStudio, AzureCloud, WindowsServer, ParallelsDesktop for MacPro, and many others; − a large number of syntactic constructs developed to better understand code writing; − very easy to learn; − after purchasing Xamaring C # you can write programs and applications for operating systems such as iOS, Android, MacOS, and Linux; − there is a whole community of experienced programmers.	− priority focus on the Windows platform (development for various platforms is already available today); − the language is free only for small firms, individual programmers, startups, and students. A large company needs to buy a licensed version of the software.

Below are examples of programming language syntax for writing code equivalent to the result (Figure 5, Figure 6 and Figure 7).

```
ссылок: 0
static void Main(string[] args)
{
    System.Console.WriteLine("Hello World!");
    //Display the string
}
```

FIGURE 5. C# code example

```
#include < stdio.h >
int main()
{
   printf("Hello, World!\n");
   return 0;
}
```

FIGURE 6. C code example

```
print "Hello World!"
```

FIGURE 7. Python code example

The figures show that when the "Java" and "C" programming languages require 4-5 lines of code, Python uses only one.

To choose a programming language for a chatbot we need to understand what a chatbot is. A chatbot is a program that finds out users' needs and then helps to meet them.

According to the statistics on the Internet, developers often choose Python as the programming language for a chatbot. Here are some examples of the advantages of creating a bot in Python: your possibilities are almost limitless, saving money, getting skills that can be useful – at least, you can earn money by creating "robots". Disadvantages: waste of time and effort on learning a programming language.

Each programming language has its pros and cons, and each language is good for specific purposes. For example, if you need to create a web application or site, you must select JavaScript based on the criteria described. For writing a chatbot in Telegram messenger, Python is the most suitable language, since it is easier to use, has a large number of clear documentation and a large selection of libraries that will help you to create the necessary services.

CONCLUSION

In the modern world technologies are constantly developing, a large number of software tools are created to help people and businesses, and all software tools are written in various programming languages. As a part of this research, it is planned to write a chatbot for the Telegram messenger, which will help increase the productivity of the technical support service of a software company. This article provides statistics on the popularity of programming languages in order to identify the most convenient, easy to learn and productive programming language for writing a chatbot for Telegram messenger. Based on the results of the analysis, the choice was made in favor of Python.

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